

## REMARKS

### Introductory Comments:

Claims 1-32 were examined in the Office Action dated May 16, 2006.

Claims 1, 8-18, and 22-24 24 were rejected under 35 U.S.C. §102(a) as allegedly being anticipated by or alternatively under 35 U.S.C. §103(a) as allegedly being unpatentable over WO 99/67193 to Kozaczko *et al.* (Kozaczko).

Claims 2-7 and 19-21 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Kozaczko.

Claims 1, 16, and 17 were rejected under 35 U.S.C. §102(a) as allegedly being anticipated by or alternatively under 35 U.S.C. §103(a) as allegedly being unpatentable over JP 10-25101 to Koetsu *et al.* (Koetsu).

Claims 8-15, and 22-24 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Koetsu.

Claims 1 and 10-18 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over either U.S. Patent Application Publication No. 2002/0061277 to Korotkikh *et al.* or U.S. Patent Application Publication No. 2003/0064887 to Ruettinger *et al.*

Claims 11, 13-15, 19 and 25-32 were rejected under 35 U.S.C. §112, second paragraph as being indefinite.

## **SUPPORT FOR AMENDMENTS**

The applicants have amended claims 1 and 16 to recite that the mixture is heated at increased pressure. The amendment finds support in the claims as originally filed, such as claims 13 and 26, and in the specification at paragraph 18.

Claim 13 has been canceled without prejudice.

Claim 14 has been amended to depend from claim 1 instead of the now canceled claim 13, thereby correcting for dependency.

Claim 19 has been amended to recite “and mixtures” thereof. The amendment provides proper Markush terminology.

Claim 25 has been amended to recite that the fuel cell uses the hydrogen gas generated by the method of claim 16. The amendment provides for proper antecedent basis.

Accordingly, no new matter has been added by way of this amendment and the entry thereof is respectfully requested.

### **Addressing the Examiner’s Rejections**

#### **Rejections of the Claims Under 35 U.S.C. §112**

The Examiner has rejected claim 11 as indefinite. The applicant has amended the claim to recite that the temperature is between about 80°C and about 100°C.

The Examiner’s rejection of claim 13 is made moot by its cancellation.

The Examiner rejected claim 19 as indefinite for improper Markush terminology. The applicant has amended the claim to recite “selected from the group consisting of...and..”

The Examiner rejected claim 25 as indefinite because the “generator of claim 16” did not have antecedent basis. The applicant has amended the claim to provide the proper antecedent basis by reciting “hydrogen gas generated by the method of claim 16.”

The Examiner is respectfully requested to withdraw the rejection.

**Rejections of the Claims Under 35 U.S.C. §102(a) or Alternatively Under 35 U.S.C. §103(a)**

(a) The Examiner has rejected claims 1, 8-18, and 22-24 under 35 U.S.C. §102(a) as allegedly being anticipated by or alternatively under 35 U.S.C. §103(a) as allegedly being unpatentable over WO 99/67193 to Kozaczko *et al.* (Kozaczko). The Examiner stated that Kozaczko disclosed producing hydrogen by reacting hydrocarbons with iodine at a temperature of 400-1200 °C.

The applicant traverses the rejection. In order for a reference to anticipate an invention, the reference must teach each and every element of the claimed invention. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379, 231 USPQ 81, 90 (Fed. Cir. 1986). *Atlas Powder Co. v. E. I. du Pont De Nemours & Co.*, 750 F.2d 1569, 1574, 224 USPQ 409, 411 (Fed. Cir. 1984). Moreover, the single source must disclose all of the claimed elements “arranged as in the claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989); *Connell v. Sears Roebuck & Co.*, 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983). The cited reference does not disclose all the elements of the applicants’ claims.

Kozaczko discloses reacting aliphatic saturated hydrocarbons with iodine in the presence of a supported catalyst, such as rhodium, palladium, platinum, or nickel, to produce saturated or unsaturated hydrocarbons and hydrogen iodide (page 1, paragraphs 6 and 7). Hydrogen iodide is then decomposed into iodine and hydrogen. For example, the Abstract states that “hydrogen iodide and unreacted iodine are isolated from the mixture of hydrocarbons and hydrogen iodide

is decomposed into iodine and hydrogen,...” and in Example 1 on page 2, Kozaczko discloses that the hydrogen iodide, produced by the reaction of the alkane with iodine, is separated by distillation and then decomposed into iodine and hydrogen at a temperature of 950 °C. The reference thus teaches the production of hydrogen from hydrogen iodide and not from a hydrocarbon.

Further, Kozaczko does not disclose carrying out the reaction under increased pressure. The reaction is conducted at atmospheric pressure in all four examples given by Kozaczko. In contrast, the independent claims of the now pending claims state that the reaction is carried out at increased pressure. Thus, Kozaczko does not disclose all the elements of the claims, therefore, it does not anticipate the applicants’ invention, and the Examiner is respectfully requested to withdraw the rejection.

The applicants traverse the rejection as the Office has not established a *prima facie* case of obviousness for which three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. The teachings or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The independent claims, as amended, recite that the reaction is carried out at increased pressure to generate the hydrogen gas. Kozaczko specifically states that the reaction is carried out at atmospheric pressure. The reference thus does not disclose all the elements of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw the rejection.

(b) The Examiner rejected claims 1, 16, and 17 under 35 U.S.C. §102(a) as allegedly being anticipated by or alternatively under 35 U.S.C. §103(a) as allegedly being unpatentable over JP 10-25101 to Koetsu *et al.* (Koetsu). The Examiner stated that Koetsu taught contacting hydrocarbon with a halogen, such as iodine.

The applicants traverse the rejection under 35 U.S.C. §102(a). Koetsu states “a method for decomposing water by a reaction of water with an halogen by using activated carbon as a decomposition catalyst...” is provided (Abstract). Thus, the reference uses water as the fuel for production of hydrogen gas, and not a hydrocarbon as claimed by the applicants. Further, the halogen is used to modulate the activity of the activated carbon, and not as a catalyst in the reaction as claimed by the applicants. Finally, in the section titled “Advantage,” Koetsu teaches that the hydrocarbon is bubbled into the reaction solution to “prevent the oxidation of activated carbon.” The reference thus does not teach the use of hydrocarbon as the fuel, use of iodine as the catalyst, or heating the mixture at increased pressure to generate hydrogen gas. Koetsu does not disclose all the elements of the applicants’ claims, therefore, the Examiner is respectfully requested to withdraw the rejection.

The applicants traverse the alternative rejection under 35 U.S.C. §103(a) as the Office has not established a *prima facie* case of obviousness. According to *In re Vaeck*., the reference must teach all the elements of the claims in order for the Office to establish a *prima facie* case of obviousness. As discussed above, Koetsu does not disclose all the elements of the applicants’ claims, therefore, the applicants’ claims are not *prima facie* obvious. The Examiner is respectfully requested to withdraw the rejection.

#### **Rejections of the Claims Under 35 U.S.C. §103(a)**

(a) The Examiner rejected claims 2-7 and 19-21 under 35 U.S.C. §103(a) as allegedly being unpatentable over Kozaczko.

The applicants traverse the rejection as the Office has not established a *prima facie* case of obviousness for which three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. The teachings or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The rejected dependent claims 2-7 and 19-21 depend from independent claims 1 and 16 respectively. The independent claims, as amended, recite that the reaction is carried out at increased pressure to generate the hydrogen gas. Kozaczko specifically states that the reaction is carried out at atmospheric pressure. The reference thus does not disclose all the elements of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw the rejection.

(b) The Examiner rejected claims 8-15, and 22-24 under 35 U.S.C. §103(a) as allegedly being unpatentable over Koetsu.

The applicants traverse the rejection. Koetsu discloses a method for decomposing water using activated carbon. The reference does not teach the use of hydrocarbon as fuel for the production of hydrogen as claimed by the applicants, or the use of iodine as the catalyst. In Koetsu, the halogen is used to modulate the activity of the activated carbon, and not as a catalyst in the reaction as claimed by the applicants, and the hydrocarbon is bubbled into the reaction solution to "prevent the oxidation of activated carbon." Koetsu does not teach the use of

hydrocarbon as the fuel, use of iodine as the catalyst, or heating the mixture at increased pressure to generate hydrogen gas. Koetsu does not disclose all the elements of the applicants' claims, therefore, the Examiner is respectfully requested to withdraw the rejection.

(c) The Examiner rejected 1 and 10-18 under 35 U.S.C. §103(a) as allegedly being unpatentable over either U.S. Patent Application Publication No. 2002/0061277 to Korotkikh *et al.* or U.S. Patent Application Publication No. 2003/0064887 to Ruettinger *et al.*

The applicants traverse the rejection as both references teach away from the applicants' invention. Korotkikh, at paragraph 5, and Ruettinger at paragraph 112, specifically state that sulfur and halogens can poison and deactivate the catalysts of their invention. The catalysts of both Korotkikh and Ruettinger catalyze the reaction of carbon monoxide with steam to produce hydrogen and carbon dioxide. The references teach that halogens poison and deactivate the catalyst. Therefore, one of skill in the art would not use iodine to provide the reaction mixture, as claimed by the applicants. Therefore, the Examiner is respectfully requested to withdraw the rejection.

## CONCLUSION

Applicants respectfully submit that the claims define an invention that is enabled and patentable over the art, and a notice of allowance is earnestly solicited. If the Examiner has any questions concerning this Response, the Examiner is invited to telephone Applicants' representative at (650) 335-7818.

Respectfully submitted,  
Harutyunyan et al.

Dated: October 12, 2006

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